APPENDIX A - Investigation Participants

Mine Safety and Health Administration

Allyn C. Davis, Accident Investigation Coordinator, Coal Mine Safety and Health
P. Michael Hall, Chief, Electrical Section
William A. McGilton, Supervisory Coal Mine Safety and Health Inspector
Ronald L. Sidwell, Coal Mine Safety and Health Inspector, (Electrical)
Daniel L. Stout, Electrical Engineer
Clete R. Stephan, Mining Engineer, Pittsburgh Safety and Health Technology Center
Chris A. Weaver, Mining Engineer, Ventilation
Joseph R. Yudasz, Coal Mine Safety and Health Inspector

West Virginia Office of Miner's Health, Safety and Training

John Larry, Assistant Inspector-At-Large
Brian Mills, Inspector-At-Large
Roger Powell, Inspector-At-Large

Consolidation Coal Company

Charles E. Bane, Safety Supervisor
Dave A. Clise, Mine Foreman
John T. Higgins, Superintendent
Jack A. Holt, Vice President Safety
Richard Marlowe, Chief Inspector

United Mine Workers of America

Mark Cochran, Mine Safety Committee Chairman
Wayne Conaway, Miner's Representative
Rich Eddy, District 31 President
Dennis O'Dell, International Representative
Terry Osborne, Regional Director
Gary Trout, International Representative
Roy Williams, Miner's Representative

APPENDIX B - Persons Interviewed

John T. Higgins, Superintendent
Dave A. Clise, Mine Foreman
Mark Watkins, Assistant Superintendent
Clarence Moore, Longwall Foreman (Afternoon Shift)
Dave Frazier, Longwall Foreman (Day Shift)
Mike Tatterson, Maintenance Foreman (Day Shift)
Linz Booth, General Inside Labor (Day Shift)
Larry Straight, General Inside Labor (Day Shift)
Leo McIntosh, Mechanic (Day Shift)
Walt Simatic, Shift Foreman (Afternoon Shift)
Jeff Myers, Belt Foreman (Day Shift)
Arthur Reeves, Shift Foreman (Midnight Shift)
Steve Harris, Longwall Foreman (Midnight Shift)
Jim Welch, Maintenance Foreman (Midnight Shift)
Wyatt Bittinger, Maintenance Foreman (Midnight Shift)
Terry Osborne, Foreman (Midnight Shift)
Roger Lee Sharp, Yard Foreman (Midnight Shift)
Jim Ammons, Fireboss (Midnight Shift)
Dave Wilson, Electrical Foreman (Day Shift)

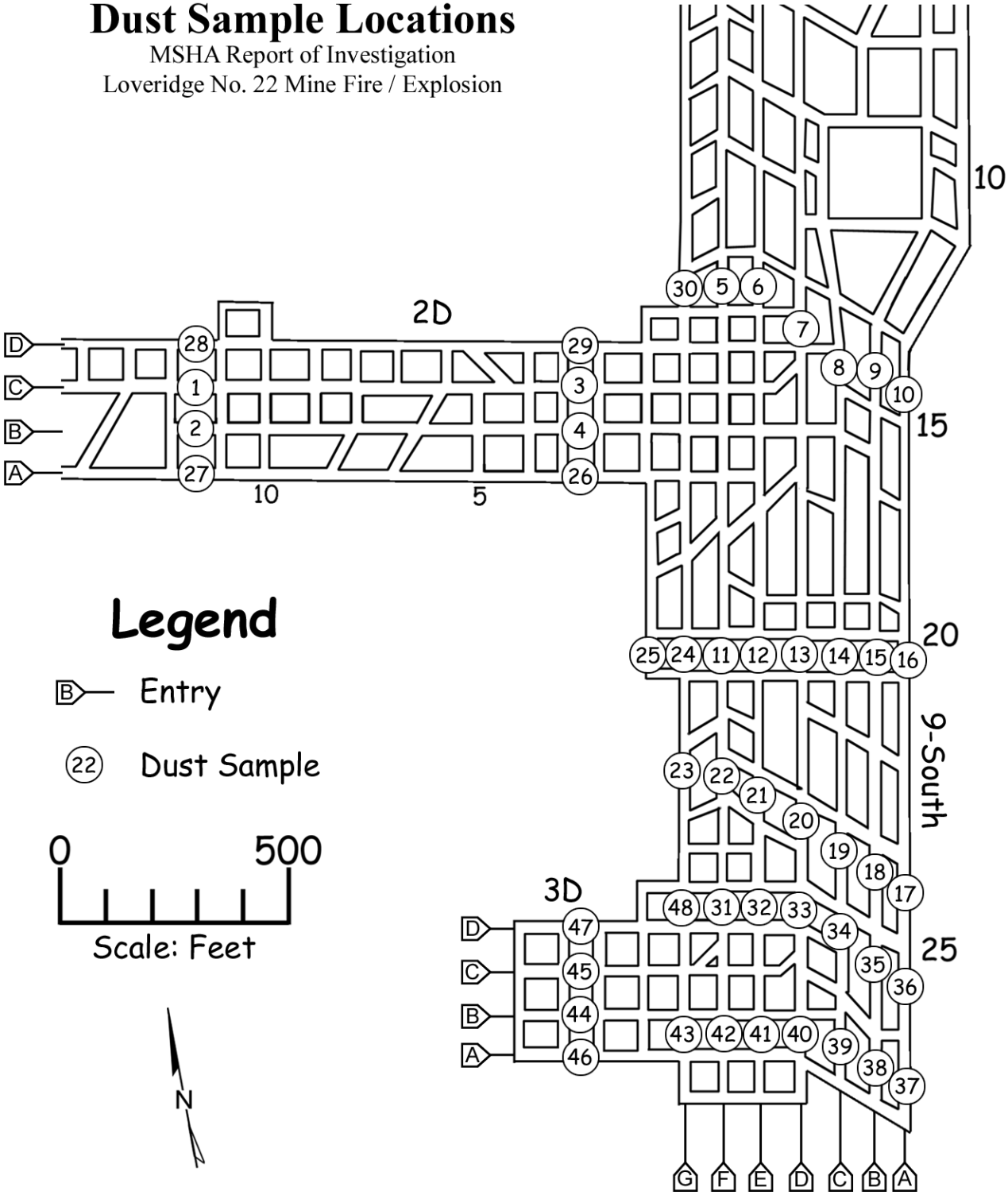
APPENDIX C – Dust Sample Analysis Results

Sample #	Location (refer to map on page 44)	Incombustible Content (%)	Coke Content	Sample Description	Date Collected
1	2D, C Entry, between crosscuts 11-12	Not Analyzed	X-Large	Band	01/08/2001
2	2D, B Entry, between crosscuts 11-12	Not Analyzed	X-Large	Band	01/08/2001
3	2D, C Entry, between crosscuts 2-3	Not Analyzed	X-Large	Band	01/08/2001
4	2D, B Entry, between crosscuts 2-3	Not Analyzed	X-Large	Band	01/08/2001
5	9-South, F Entry, between crosscuts 12-13	Not Analyzed	X-Large	Band	01/08/2001
6	9-South, E Entry, between crosscuts 12-13	Not Analyzed	Small	½ Floor & Left Rib	01/08/2001
7	9-South, D Entry, between crosscuts 13-14	Not Analyzed	Large	Floor & Ribs	01/08/2001
8	9-South, C Entry, between crosscuts 14-15	Not Analyzed	X-Large	Band	01/08/2001
9	9-South, B Entry, between crosscuts 14-15	Not Analyzed	X-Large	Band	01/08/2001
10	9-South, A Entry, between crosscuts 14-15	Not Analyzed	X-Large	Band	01/08/2001
11	9-South, F Entry, between crosscuts 20-21	Not Analyzed	Large	¾ Floor & Left Rib	01/08/2001
12	9-South, E Entry, between crosscuts 20-21	Not Analyzed	X-Large	Floor & Ribs	01/08/2001
13	9-South, D Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/08/2001
14	9-South, C Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/08/2001
15	9-South, B Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/08/2001
16	9-South, A Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/08/2001
17	9-South, A Entry, between crosscuts 23-24	Not Analyzed	X-Large	Band	01/09/2001
18	9-South, B Entry, between crosscuts 23-24	Not Analyzed	X-Large	Band	01/09/2001
19	9-South, C Entry, between crosscuts 23-24	Not Analyzed	X-Large	Band	01/09/2001
20	9-South, D Entry, between crosscuts 23-24	Not Analyzed	Small	Band	01/09/2001
21	9-South, E Entry, between crosscuts 23-24	Not Analyzed	Large	Floor & Ribs	01/09/2001
22	9-South, F Entry, between crosscuts 23-24	Not Analyzed	X-Large	Band	01/09/2001
23	9-South, G Entry, between crosscuts 22-23	Not Analyzed	X-Large	Band	01/09/2001
24	9-South, G Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/09/2001
25	9-South, H Entry, between crosscuts 20-21	Not Analyzed	X-Large	Band	01/09/2001
26	2D, A Entry, between crosscuts 2-3	Not Analyzed	Large	Band	01/09/2001
27	2D, A Entry, between crosscuts 11-12	Not Analyzed	Large	Band	01/09/2001
28	2D, D Entry, between crosscuts 11-12	Not Analyzed	X-Large	Band	01/09/2001
29	2D, D Entry, between crosscuts 2-3	Not Analyzed	Small	Floor	01/09/2001
30	9-South, G Entry, between crosscuts 12-13	Not Analyzed	Small	Band	01/09/2001
31	9-South, F Entry, between crosscuts 25-26	34.10	X-Large	Floor	01/23/2001
32	9-South, E Entry, between crosscuts 25-26	59.40	X-Large	Floor	01/23/2001
33	9-South, D Entry, between crosscuts 25-26	47.60	X-Large	Floor	01/23/2001
34	9-South, C Entry, between crosscuts 25-26	45.90	X-Large	Floor	01/23/2001
35	9-South, B Entry, between crosscuts 25-26	56.10	X-Large	Floor	01/23/2001
36	9-South, A Entry, between crosscuts 25-26	83.10	X-Large	Floor	01/23/2001
37	9-South, A Entry, between crosscuts 27-28	81.00	X-Large	Floor	01/23/2001
38	9-South, B Entry, between crosscuts 27-28	52.90	X-Large	Floor	01/23/2001
39	9-South, C Entry, between crosscuts 27-28	39.40	X-Large	Floor	01/23/2001
40	9-South, D Entry, between crosscuts 28-29	36.60	X-Large	Floor	01/23/2001
41	9-South, E Entry, between crosscuts 28-29	47.80	X-Large	Floor	01/23/2001
42	9-South, F Entry, between crosscuts 28-29	53.30	X-Large	Floor	01/23/2001
43	9-South, G Entry, between crosscuts 28-29	49.70	X-Large	Floor	01/23/2001
44	3D, B Entry, between crosscuts 2-3	20.20	X-Large	Floor	01/23/2001
45	3D, C Entry, between crosscuts 2-3	39.00	X-Large	Floor	01/23/2001
46	3D, A Entry, between crosscuts 2-3	53.60	X-Large	Floor	01/23/2001
47	3D, D Entry, between crosscuts 2-3	40.60	X-Large	Floor	01/23/2001
48	9-South, G Entry, between crosscuts 25-26	37.70	X-Large	Floor	01/23/2001

APPENDIX C

Dust Sample Locations

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion



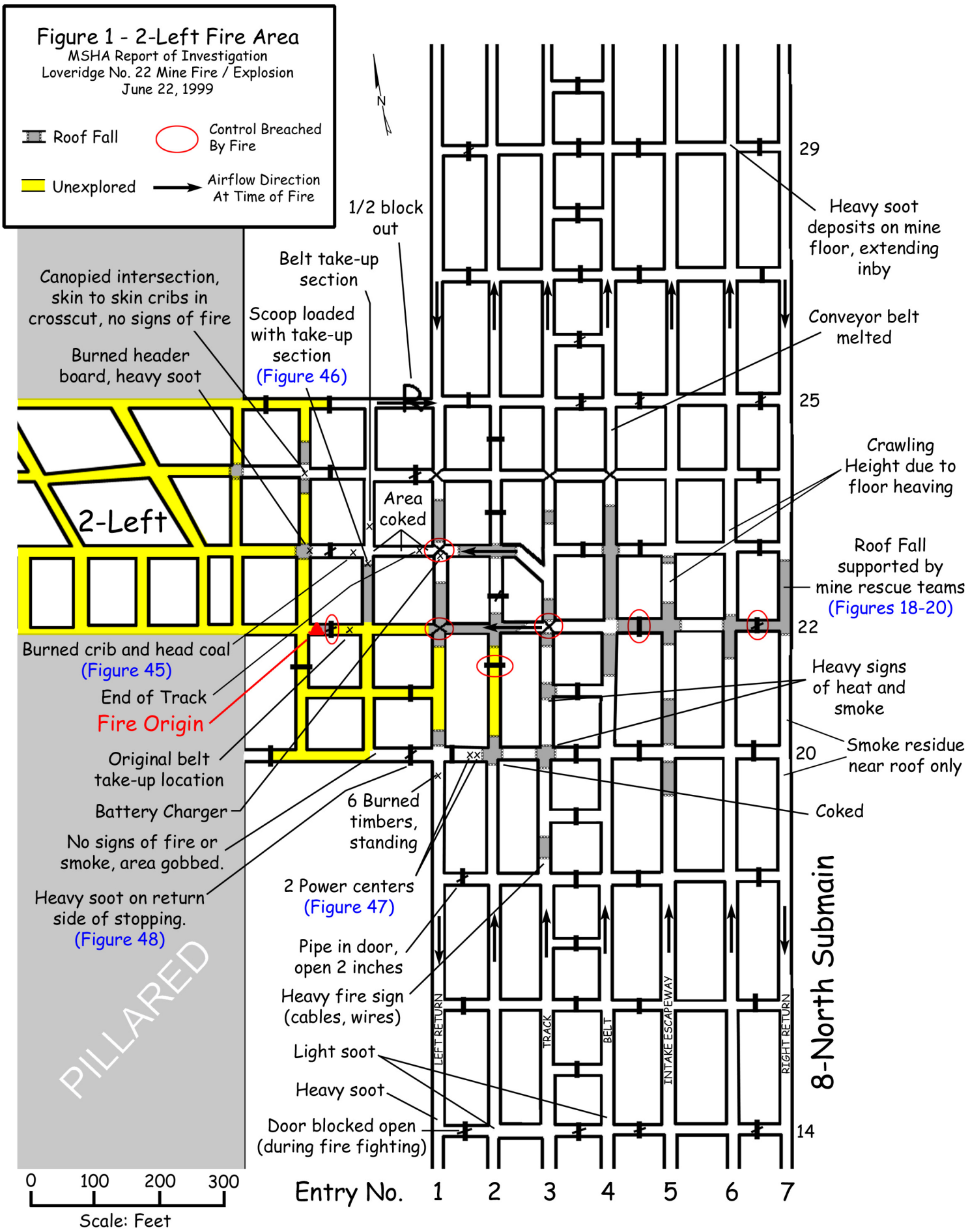
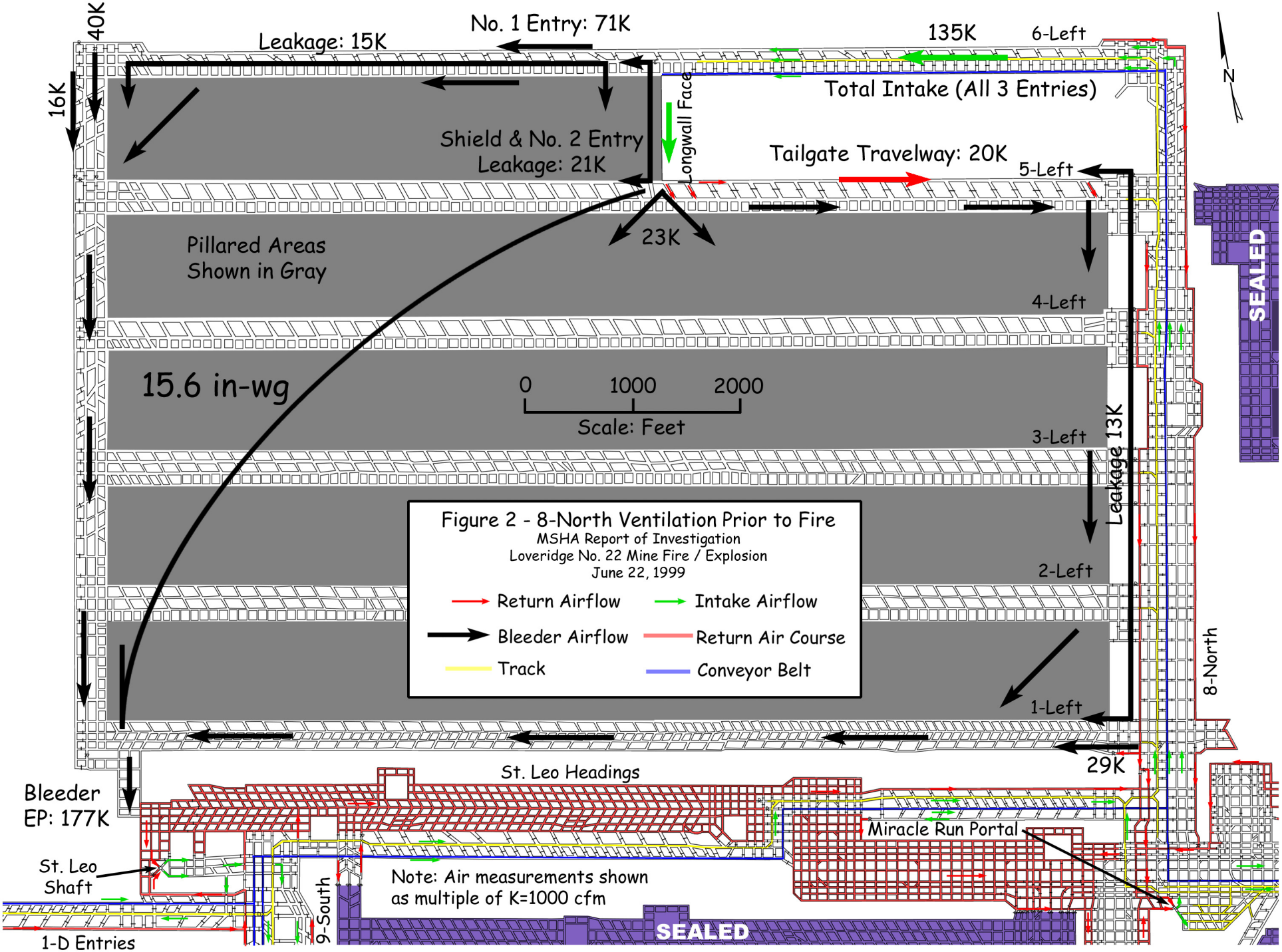


Figure 1 - 2-Left Fire Area
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999
Roof Fall
Control Breached By Fire
Unexplored
Airflow Direction At Time of Fire
N
1/2 block out
Belt take-up section
Scoop loaded with take-up section (Figure 46)
Canopied intersection, skin to skin cribs in crosscut, no signs of fire
Burned header board, heavy soot
2-Left
Area coked
Burned crib and head coal (Figure 45)
End of Track
Fire Origin
Original belt take-up location
Battery Charger
No signs of fire or smoke, area gobbed.
Heavy soot on return side of stopping. (Figure 48)
PILLARED
6 Burned timbers, standing
2 Power centers (Figure 47)
Pipe in door, open 2 inches
Heavy fire sign (cables, wires)
Light soot
Heavy soot
Door blocked open (during fire fighting)
Heavy soot deposits on mine floor, extending inby
Conveyor belt melted
Crawling Height due to floor heaving
Roof Fall supported by mine rescue teams (Figures 18-20)
Heavy signs of heat and smoke
Smoke residue near roof only
Coked
29
25
22
20
14
LEFT RETURN
TRACK
BELT
INTAKE ESCAPEWAY
RIGHT RETURN
8-North Submain
Entry No. 1 2 3 4 5 6 7
0 100 200 300
Scale: Feet


40K
16K
Leakage: 15K
No. 1 Entry: 71K
135K
6-Left
Total Intake (All 3 Entries)
Longwall Face
Shield & No. 2 Entry
Leakage: 21K
Tailgate Travelway: 20K
5-Left
23K
Pillared Areas
Shown in Gray
4-Left
15.6 in-wg
0
1000
2000
Scale: Feet
3-Left
Leakage 13K
2-Left
1-Left
29K
SEALED
8-North
Figure 2 - 8-North Ventilation Prior to Fire
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999
Return Airflow
Intake Airflow
Bleeder Airflow
Return Air Course
Track
Conveyor Belt
St. Leo Headings
Bleeder
EP: 177K
Miracle Run Portal
St. Leo
Shaft
9-South
Note: Air measurements shown
as multiple of K=1000 cfm
SEALED
1-D Entries

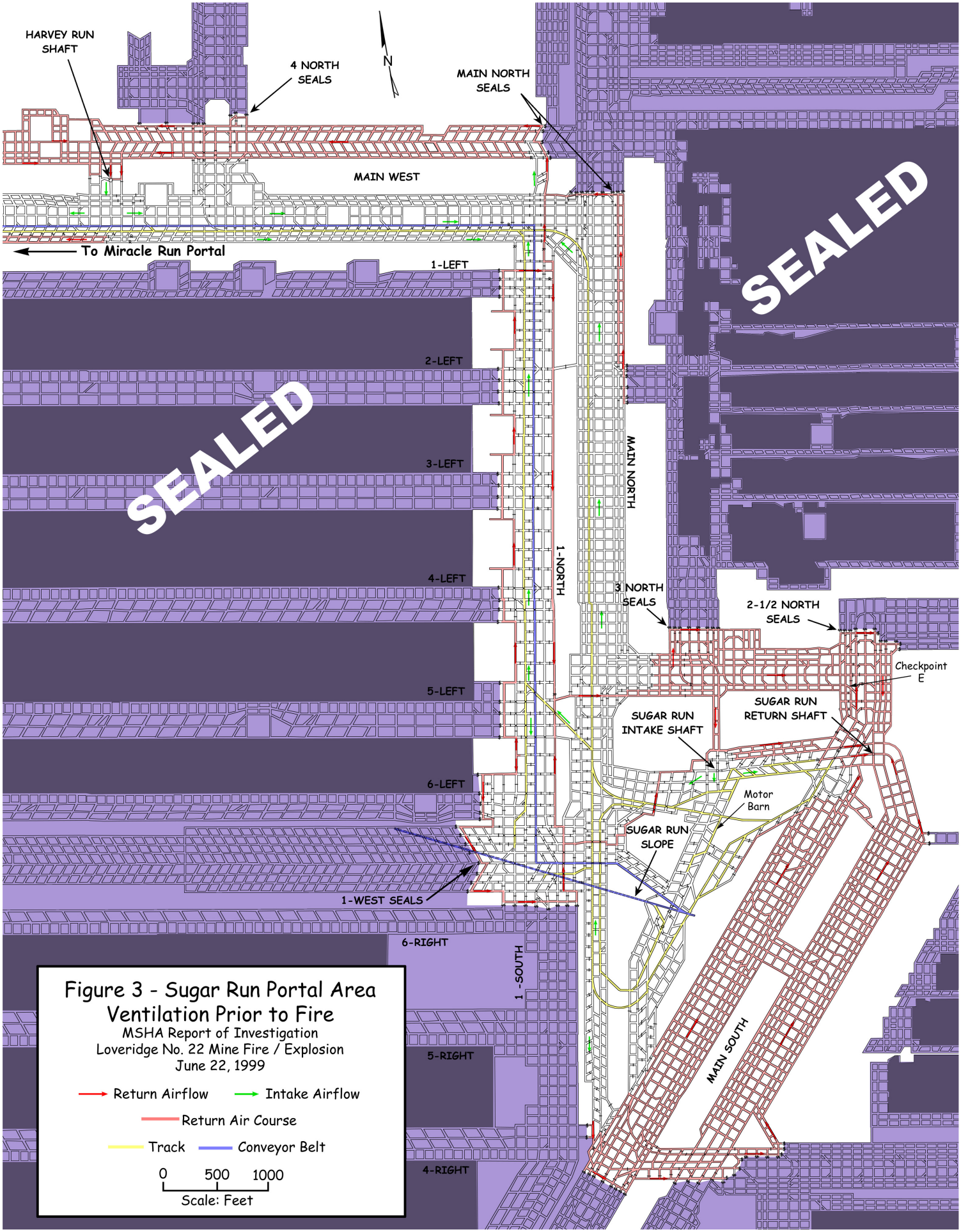


Figure 3 - Sugar Run Portal Area Ventilation Prior to Fire

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

Return Airflow — Intake Airflow
Return Air Course
Track — Conveyor Belt

0 500 1000
Scale: Feet

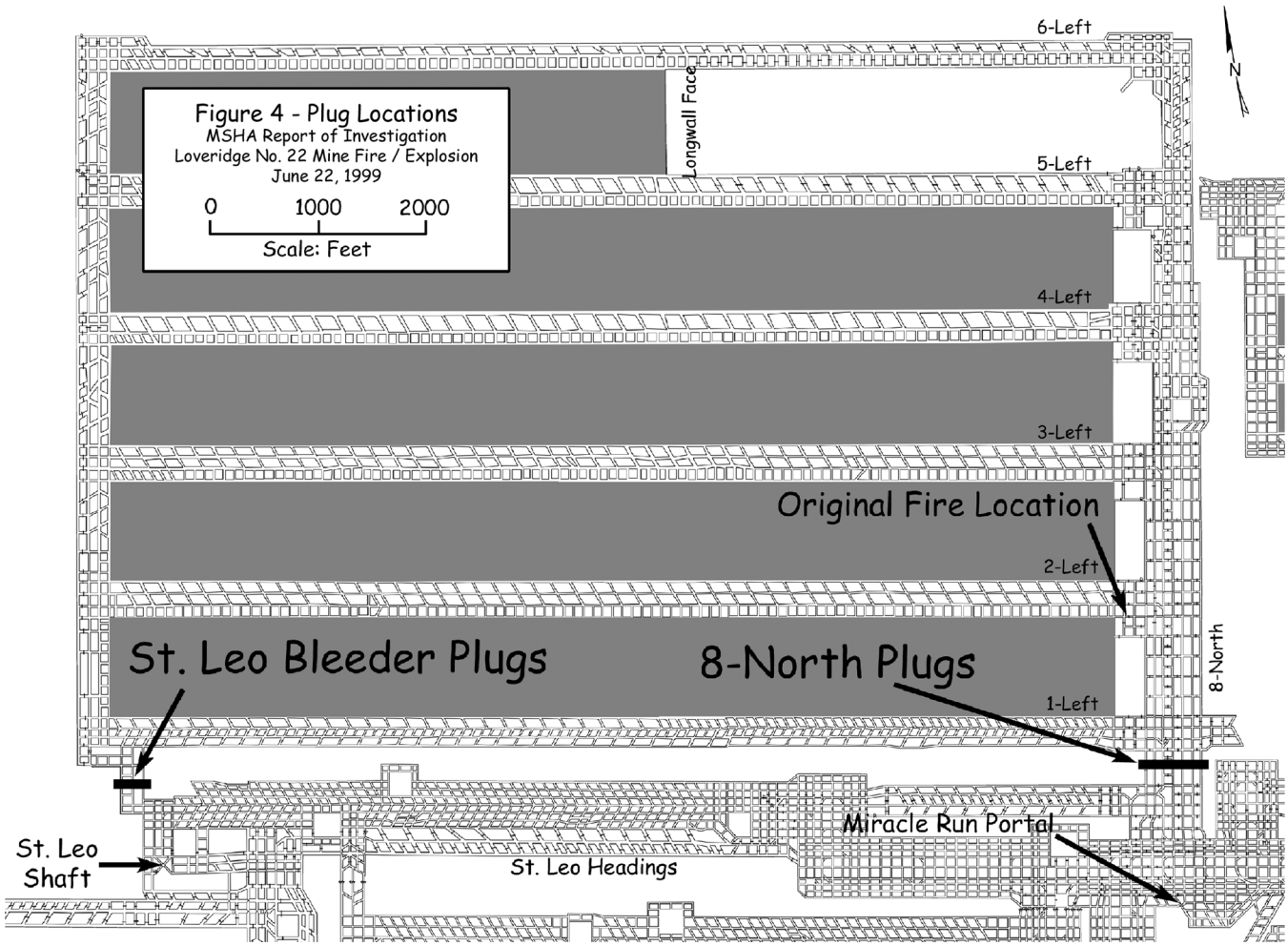


Figure 5 (bottom left): Mine rescue team members apply foam sealant to the St. Leo fan housing on June 22, 1999.

Figure 6 (bottom right): Damage to St. Leo fan and shaft after the explosion on June 26, 1999. The deflection of the top of the shaft partition is visible in this photograph.

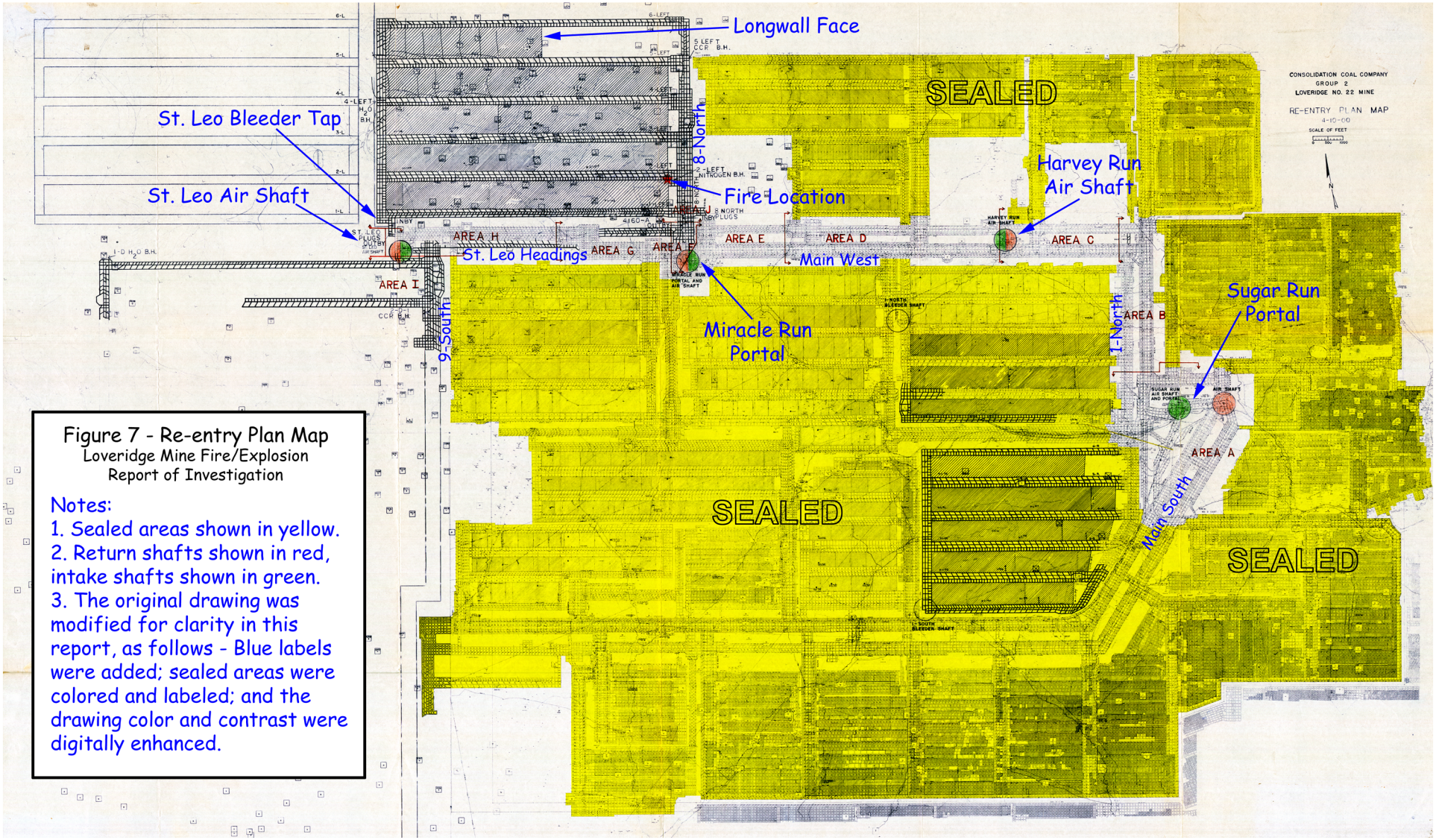


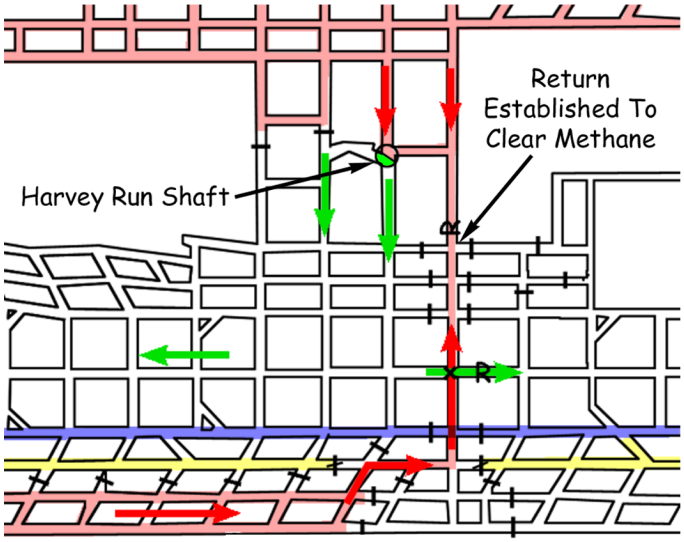
Figure 7 - Re-entry Plan Map
Loveridge Mine Fire/Explosion
Report of Investigation

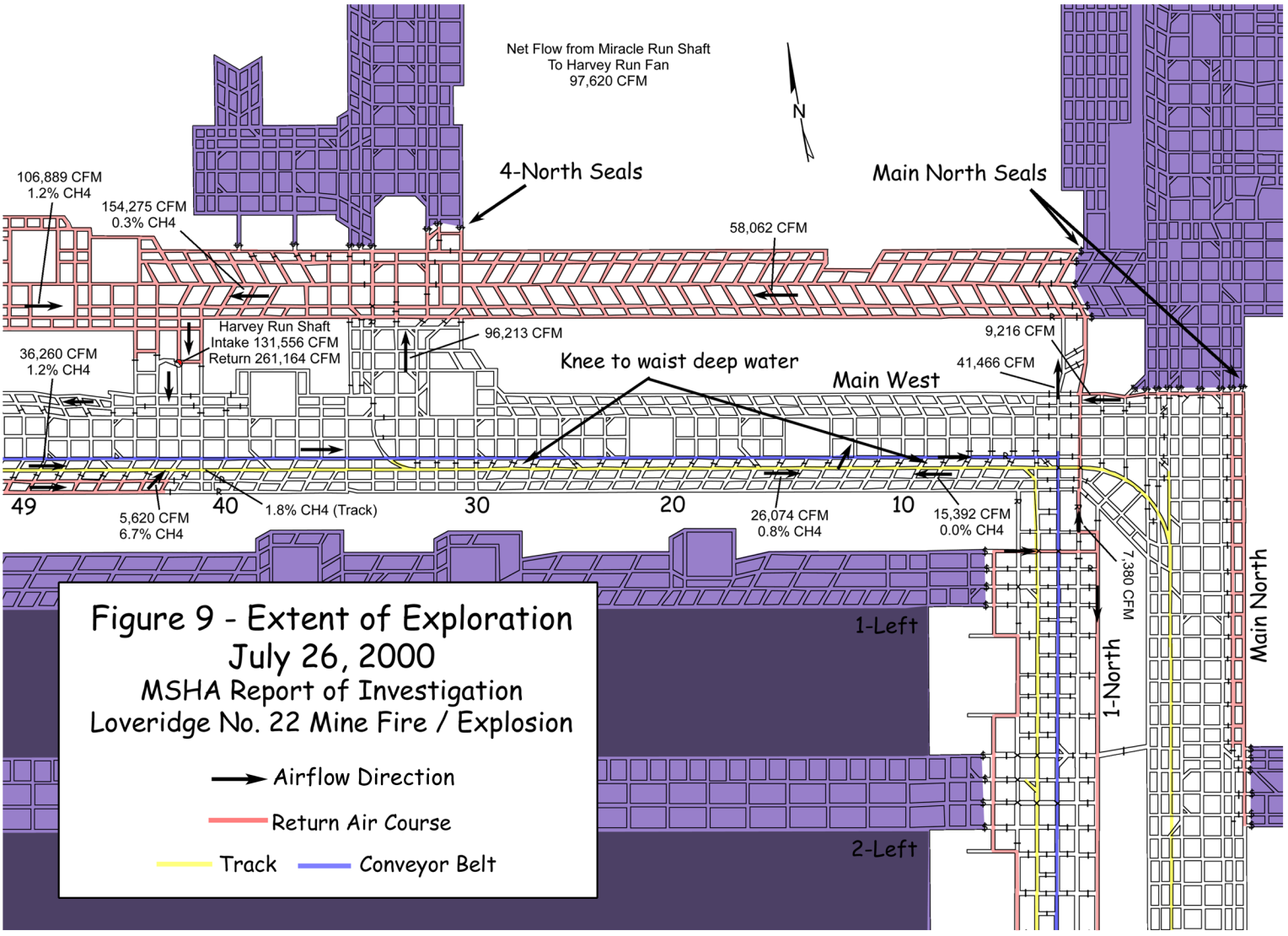
Notes:
1. Sealed areas shown in yellow.
2. Return shafts shown in red, intake shafts shown in green.
3. The original drawing was modified for clarity in this report, as follows - Blue labels were added; sealed areas were colored and labeled; and the drawing color and contrast were digitally enhanced.

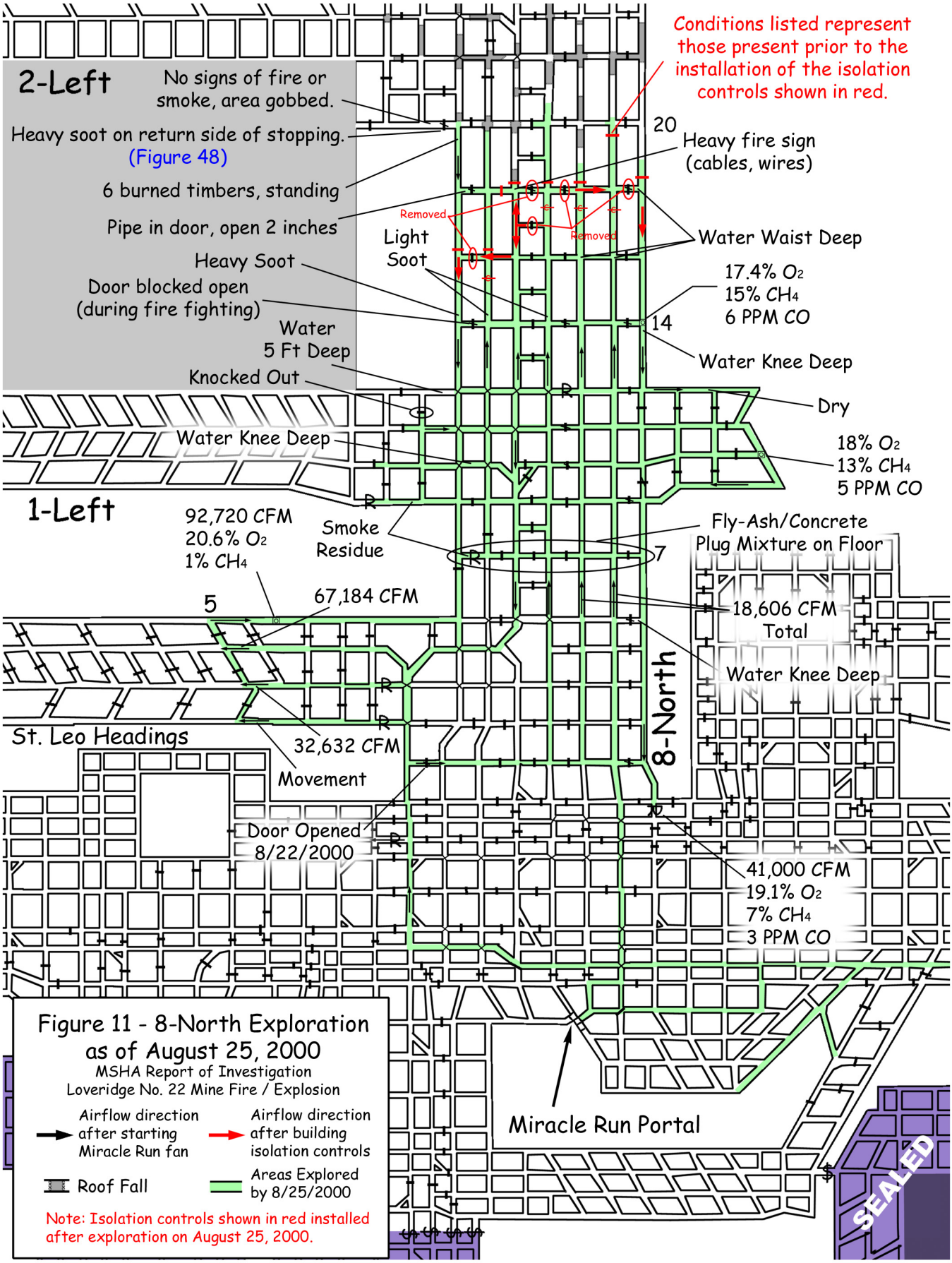
Figure 8 (top left): Flooded elevator shaft bottom at the Sugar Run Portal.

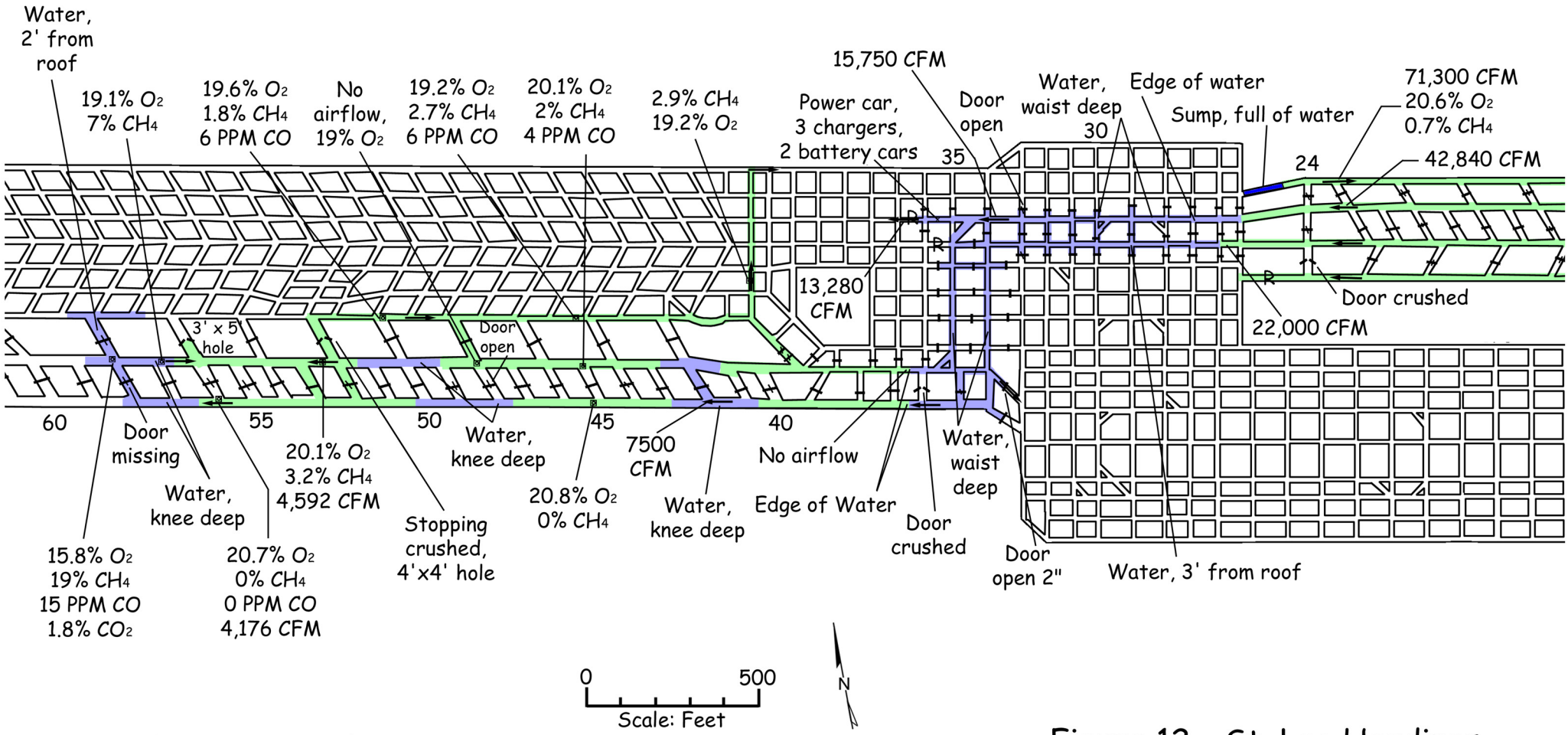
Figure 9: (bottom): Main West conditions during the initial examinations.

Figure 10 (top right): August 8, 2000, air change to clear methane from the south side of Main West.






Conditions listed represent those present prior to the installation of the isolation controls shown in red.
2-Left
No signs of fire or smoke, area gobbed.
Heavy soot on return side of stopping. (Figure 48)
6 burned timbers, standing
Pipe in door, open 2 inches
Heavy Soot
Door blocked open (during fire fighting)
Water 5 Ft Deep
Knocked Out
Water Knee Deep
1-Left
92,720 CFM
20.6% O2
1% CH4
Smoke Residue
5
67,184 CFM
St. Leo Headings
32,632 CFM
Movement
Door Opened 8/22/2000
20
Heavy fire sign (cables, wires)
Removed
Light Soot
Removed
Water Waist Deep
17.4% O2
15% CH4
6 PPM CO
14
Water Knee Deep
Dry
18% O2
13% CH4
5 PPM CO
Fly-Ash/Concrete Plug Mixture on Floor
7
18,606 CFM Total
Water Knee Deep
8-North
41,000 CFM
19.1% O2
7% CH4
3 PPM CO
Miracle Run Portal
SEALED
Figure 11 - 8-North Exploration as of August 25, 2000
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
Airflow direction after starting Miracle Run fan
Airflow direction after building isolation controls
Roof Fall
Areas Explored by 8/25/2000
Note: Isolation controls shown in red installed after exploration on August 25, 2000.



Note: Gas concentrations shown represent test results at time of initial exploration of each area. Ventilation was extended after exploring to Crosscut 52.

Figure 12 - St. Leo Headings Exploration 8/30 - 9/1/2000

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion

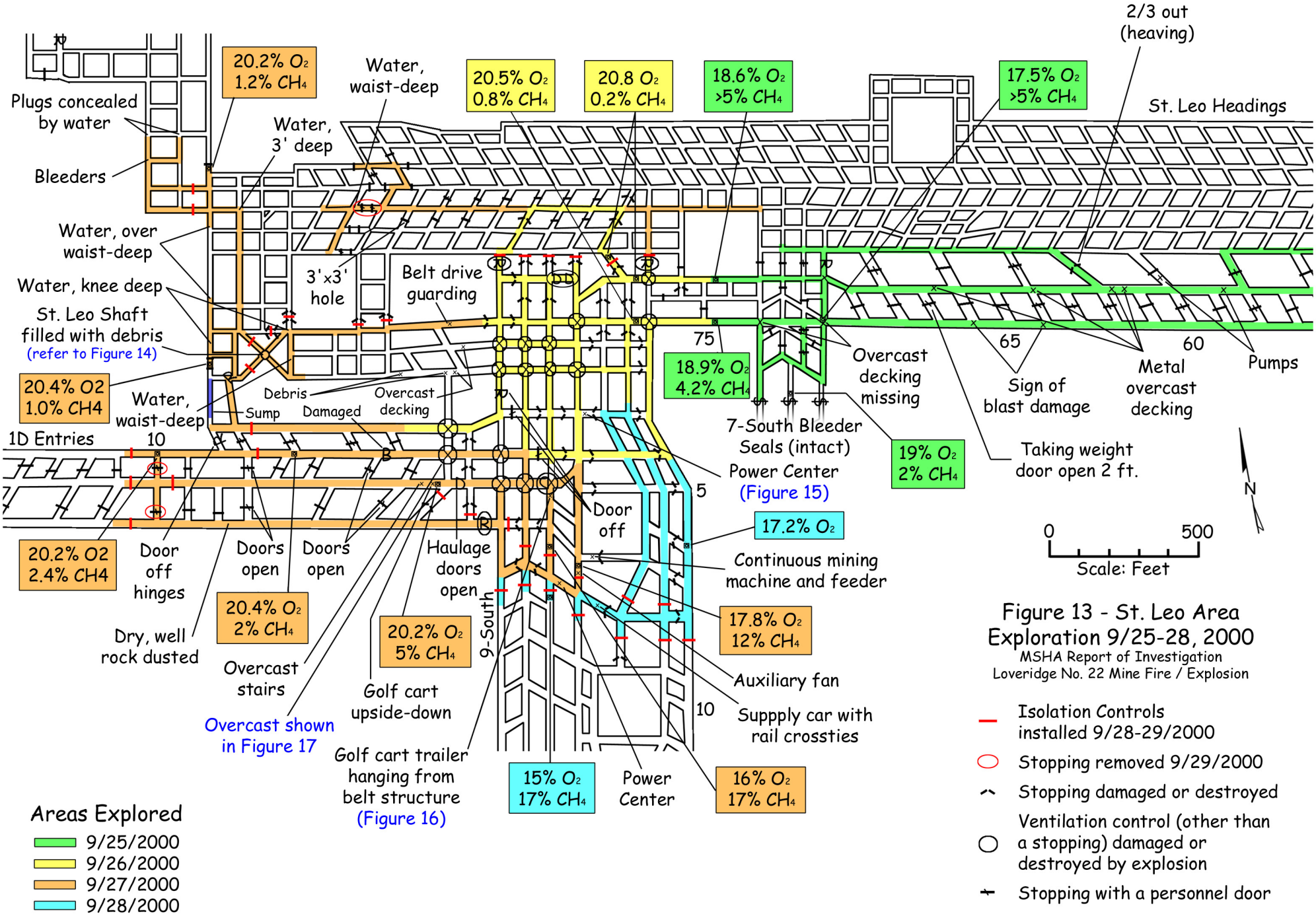


Figure 13 - St. Leo Area Exploration 9/25-28, 2000

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion

Junction of 9-South & St. Leo Headings

Notes: Nonpermissible photographic equipment was not used in this area until more permanent isolation controls were installed. As a result, Figures 14-17 were taken after rock dust was applied during the recovery operations.

Refer to Figure 13 for the locations of images shown on this page.

Figure 14 (top): St. Leo Shaft bottom, showing concrete and steel rubble from the destroyed shaft partition. This material extended approximately 50 feet up into the shaft.

Figure 15 (center left): Power center in 9-South Crosscut 3. Note the concrete block from the adjacent stopping, which was blown into the power center by the explosive forces.

Figure 16 (center right): Trailer lifted off the floor and transported down the 9-South No. 3 entry during the explosion.

Figure 17 (bottom): Overcast in Crosscut 2 of the 1D entries. Debris was scattered in all directions from the belt entry on the lower side of the overcast.

8-North Roof Fall & 1D Seal

Figure 18 (top): A miner crawls across the top of the roof fall in the 8-North No.7 entry.

Figures 19 & 20 (center): Debris along the left side of the approach to the 8-North No. 7 entry roof fall illustrates the volume of material that was manually removed during the recovery efforts.

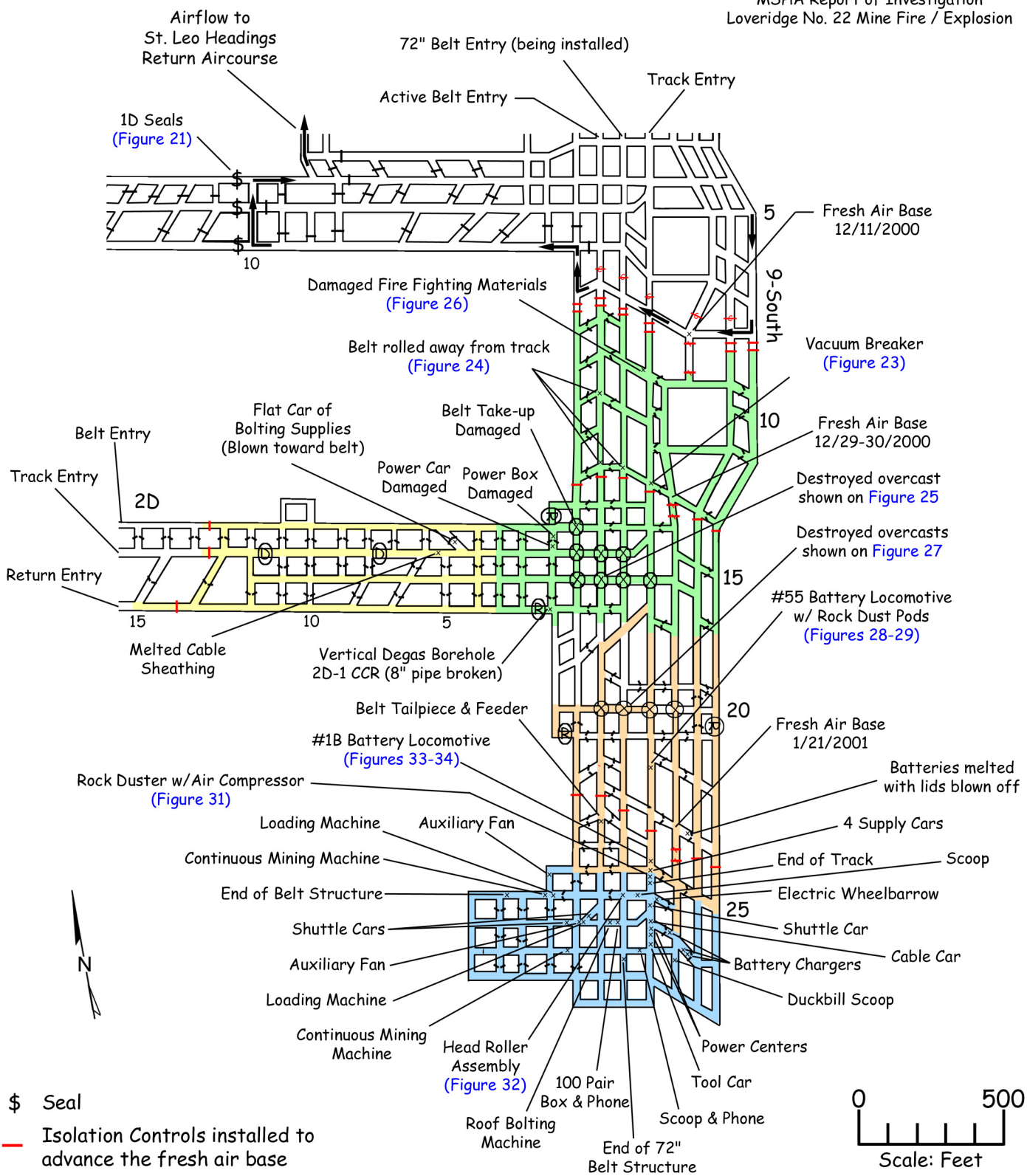
Location of Figures 18-20 shown on Figure 1.

Figure 21 (bottom): The 1D seals were equipped with steel access panels that were bolted in place. These panels permitted mine rescue teams to clear methane accumulations from immediately inby the seals upon resuming recovery of the 1D and 2D entries.

Refer to Figure 22 for the location of this seal.

Figure 22 - 9-South Exploration Map

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion



$ Seal

— Isolation Controls installed to advance the fresh air base

Stopping with personnel door

Stopping damaged or destroyed

× Overcast

Control (other than stopping) destroyed by explosion

→ Airflow direction, as of 12/11/2000. This flow pattern was extended to each fresh air base as the recovery proceeded.

Areas Explored

- 12/11/2000
- 12/29/2000
- 12/30/2000
- 1/21/2001

Figure 23 (top): This vacuum breaker box was thrown by explosive forces from the crosscut, on the right side of this picture, and deposited on the track where it was hit by additional forces from an inby direction (photo taken while facing outby in the track entry).

Figure 24 (center left): The smaller temporary belt was rolled away from the track entry (photo looking outby).

Figure 25 (center right): Damage to belt structure at an overcast.

Figure 26 (bottom left): Destroyed fire fighting station.

Figure 27 (bottom right): Investigation team surveys damage to ventilation controls.

Note: Refer to Figure 22 for locations of images shown on this page.

Figure 28 (top): A miner observes the rock dust pods located near Crosscut 21 in the 9-South track entry. The steel pod in the foreground was imploded, while that nearest the miner remained intact.

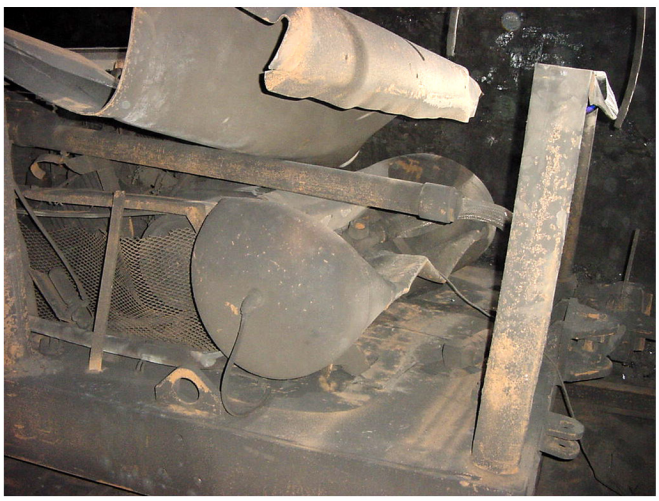


Figure 29 (center left): Outby end of Locomotive #55.

Figure 30 (center right): Inby end of Locomotive #55.

Figure 31 (bottom): Air compressor tank on a rock dusting machine, located at the end of the 9-South track entry.

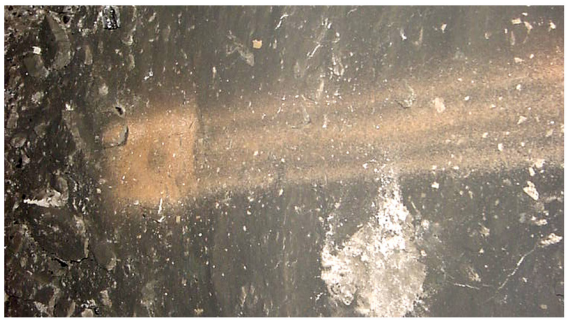
Note: Refer to Figure 22 for locations of images shown on this page.

Note: Refer to Figure 22 for locations of images shown on this page.

Figure 32 (top): Head roller assembly that was being installed at the junction of the 3D and 9-South belt entries. The roof elevation in the adjacent 9-South belt entry is visible in the lower right corner of this image.

Figure 33 (center left): Inby end of Locomotive #1B.

Figure 34 (center right): View across the top of Locomotive #1B.



Figures 35-36 (bottom): Rust particles deposited on the mine floor. These particles dropped 6-7 feet from rusting roof bolt channels, forming detailed images of the channels on the floor throughout 9-South. This indicated that there was no natural ventilation in the submain after the explosion.

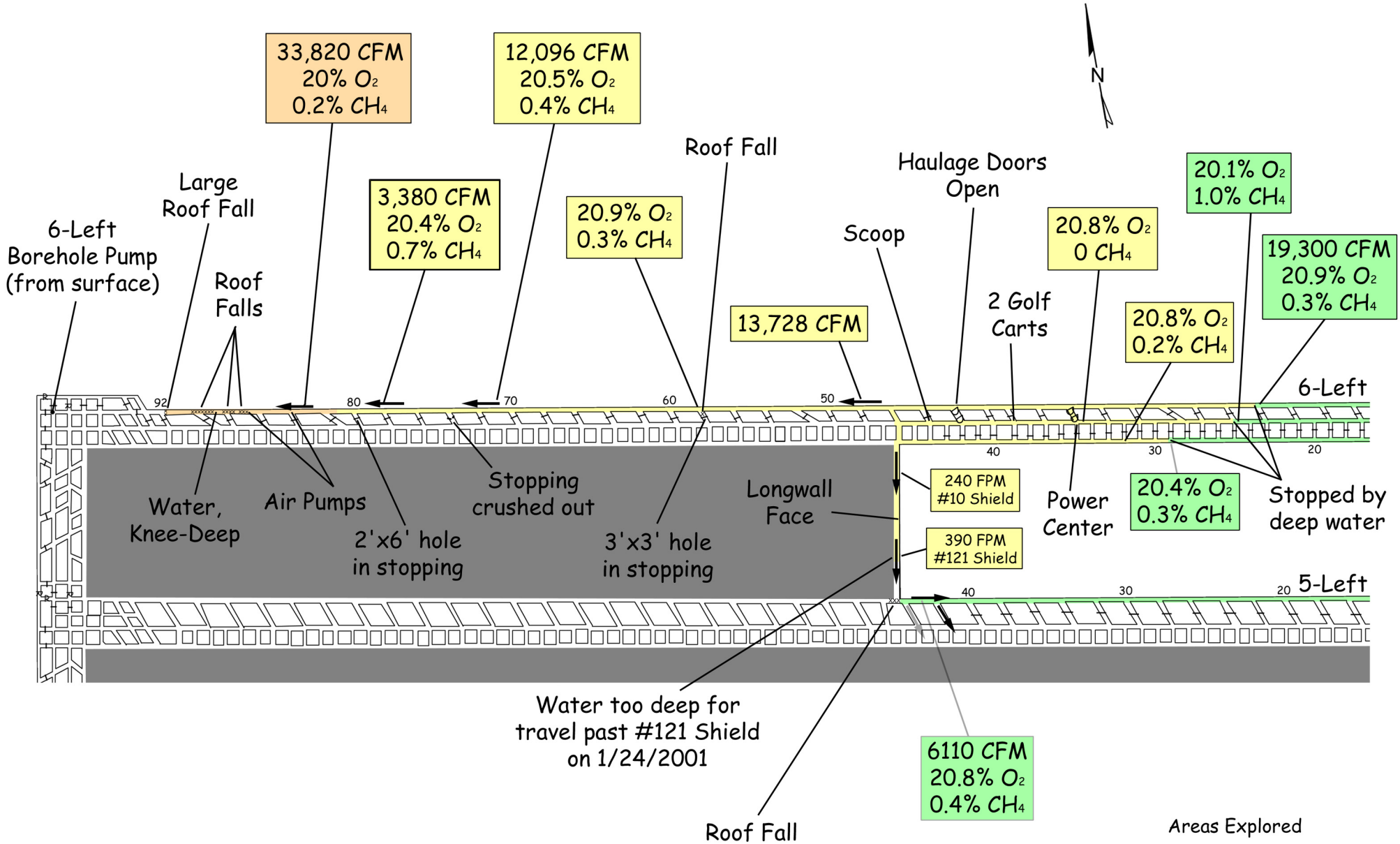


Figure 37 - 6-Left Exploration Map
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

Note: Air measurements represent values at time of initial exploration.

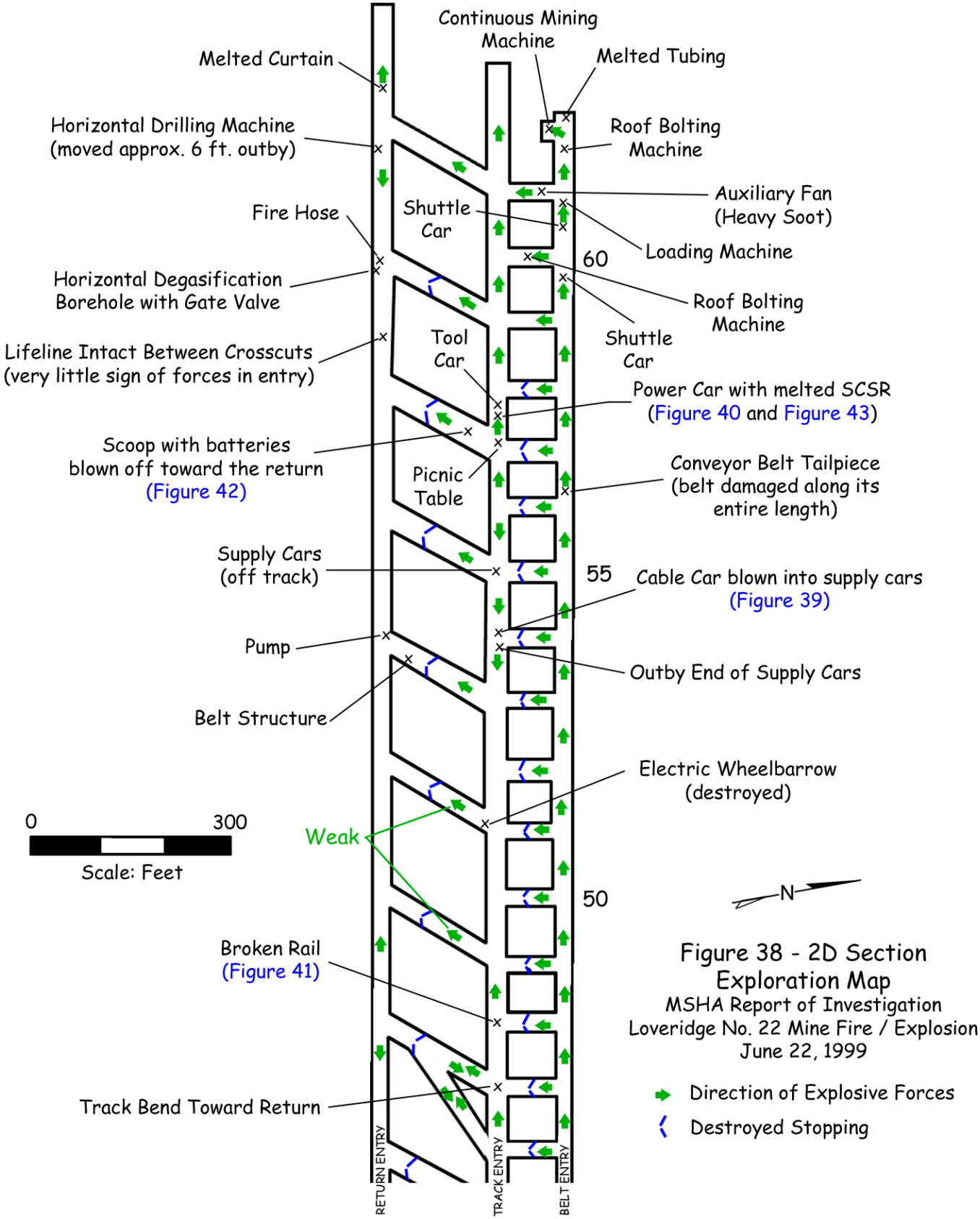


Figure 38 - 2D Section Exploration Map
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

Direction of Explosive Forces

Destroyed Stopping

2D Section Damage

(images taken after area was rock dusted)

Figure 39 (top): Cable car blown into supply cars by forces from the adjacent belt entry to the right.

Figure 40 (center left): Damaged power car near the end of the track.

Figure 41 (center right): The track was displaced and rail was broken by forces from the adjacent belt entry.

Figure 42 (bottom left): Batteries blown off of scoop.

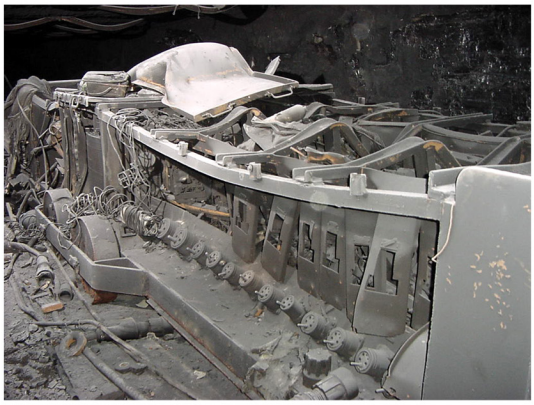


Figure 43 (bottom right): Damaged power car (same as Figure 40)

Note: Figure 38 shows image locations.

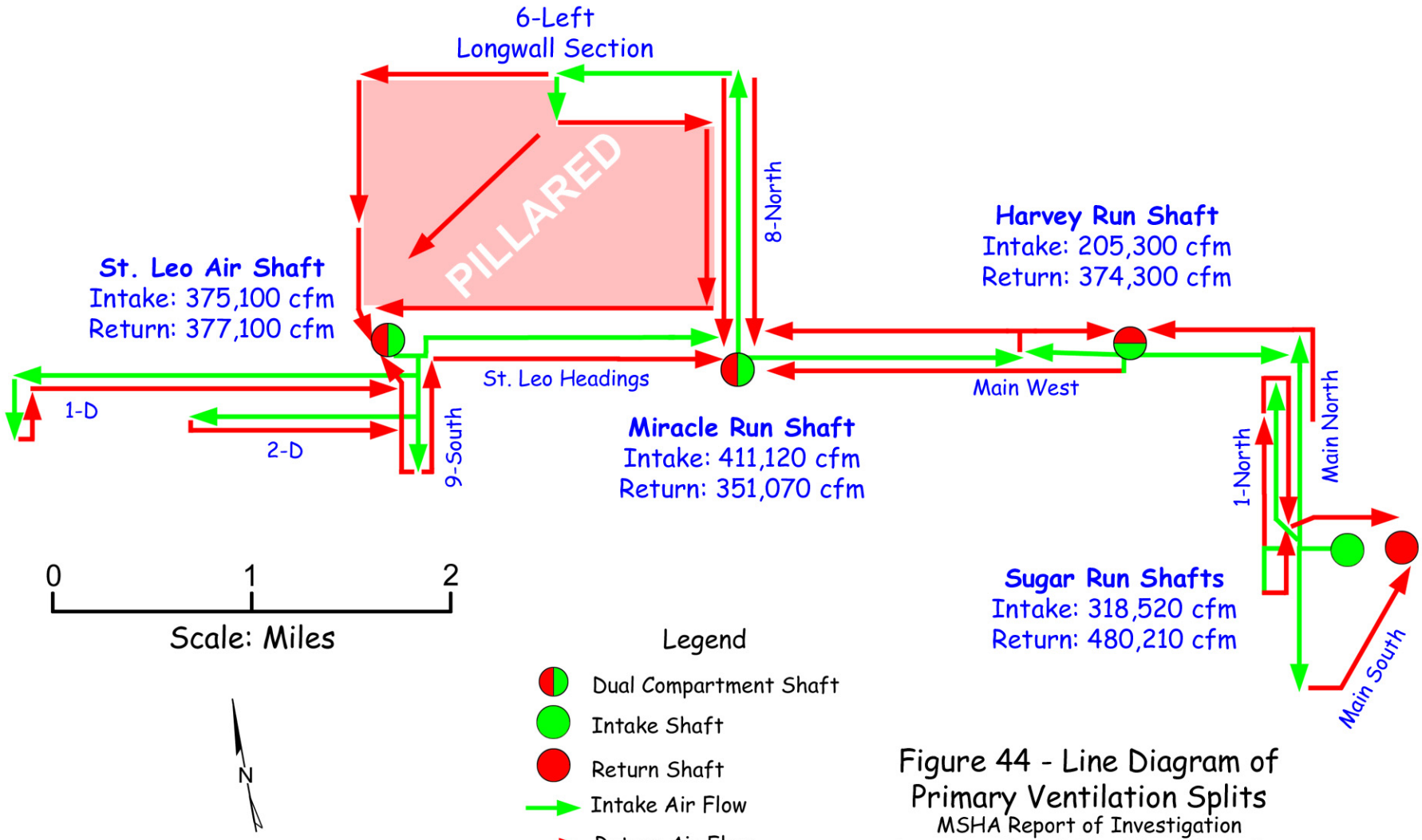


Figure 44 - Line Diagram of Primary Ventilation Splits
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

2-Left Fire Area

Figure 45 (top): Burned roof coal and cribbing adjacent to a roof fall near the fire origin.

Figure 46 (center): Roof fall covering a scoop that was loaded with the last section of the belt take-up following cutting operations.

Figure 47 (bottom left): Power centers located in the 8-North entries, just outby the fire origin.

Figure 48 (bottom right): Soot deposits a stopping in the return entry immediately downwind of the fire origin.

Note: Refer to Figure 1 for image locations.

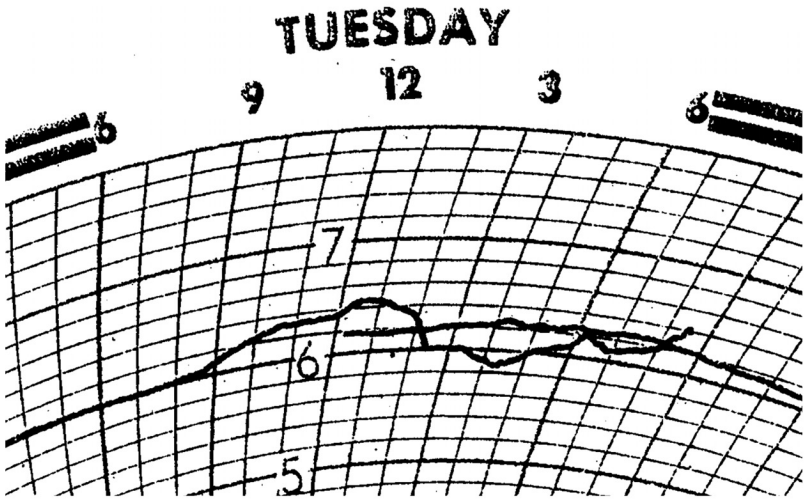


Figure 49 - Miracle Run Fan Pressure Recording Chart

MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

Note: Fan chart recording period:

12:03 p.m., June 15, 1999
to
8:40 p.m., June 22, 1999

Detail: June 22, 1999

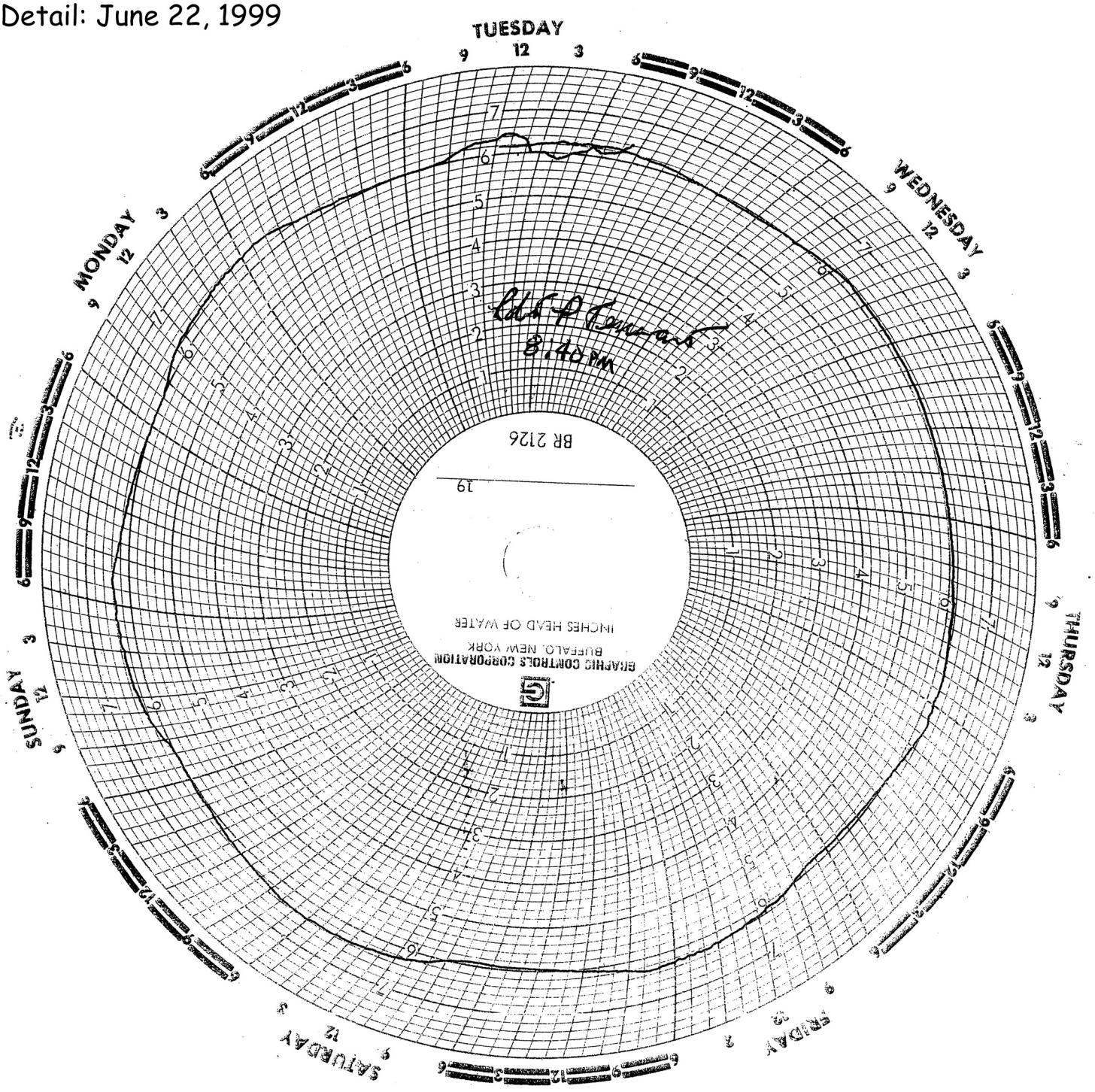
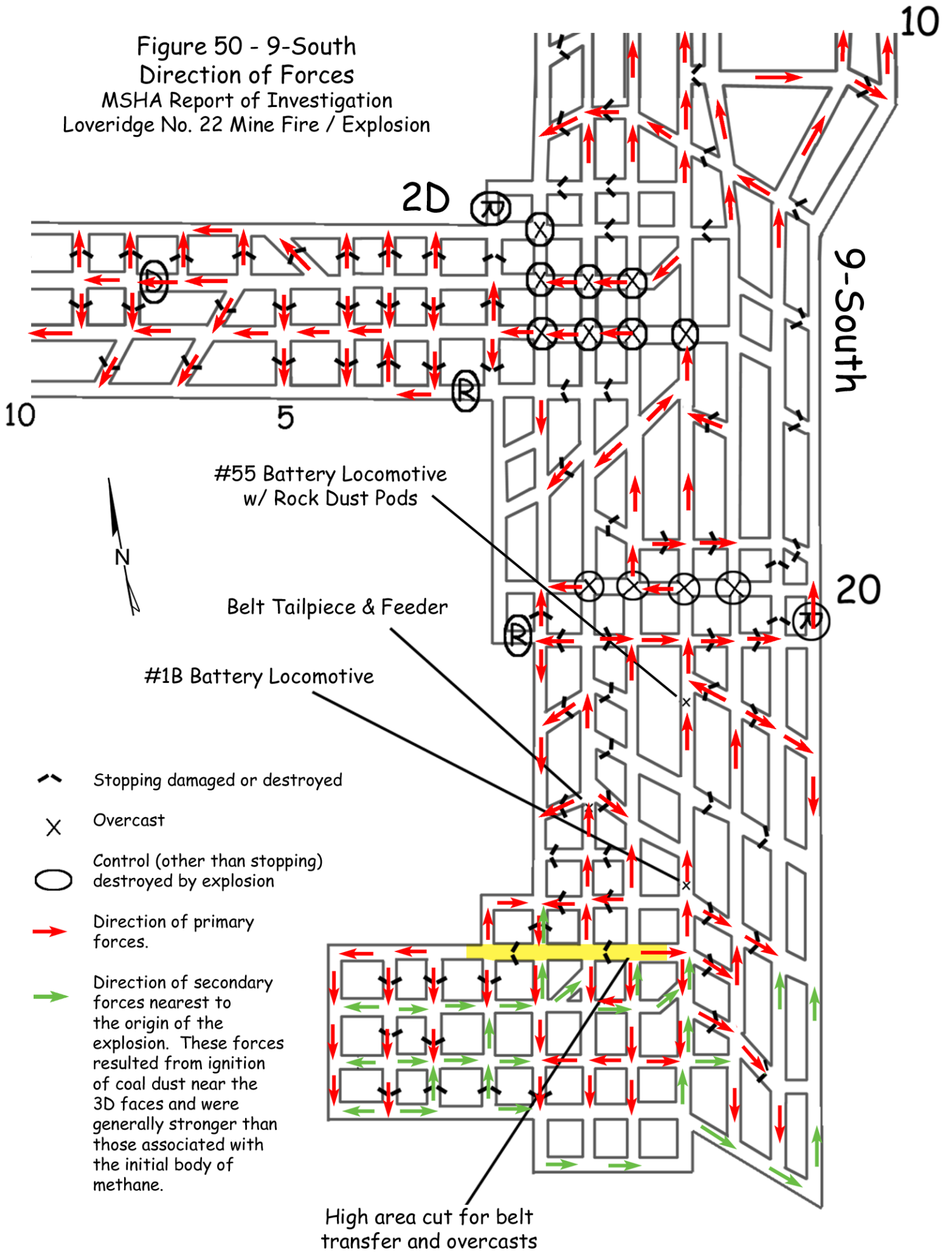


Figure 50 - 9-South
Direction of Forces
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion



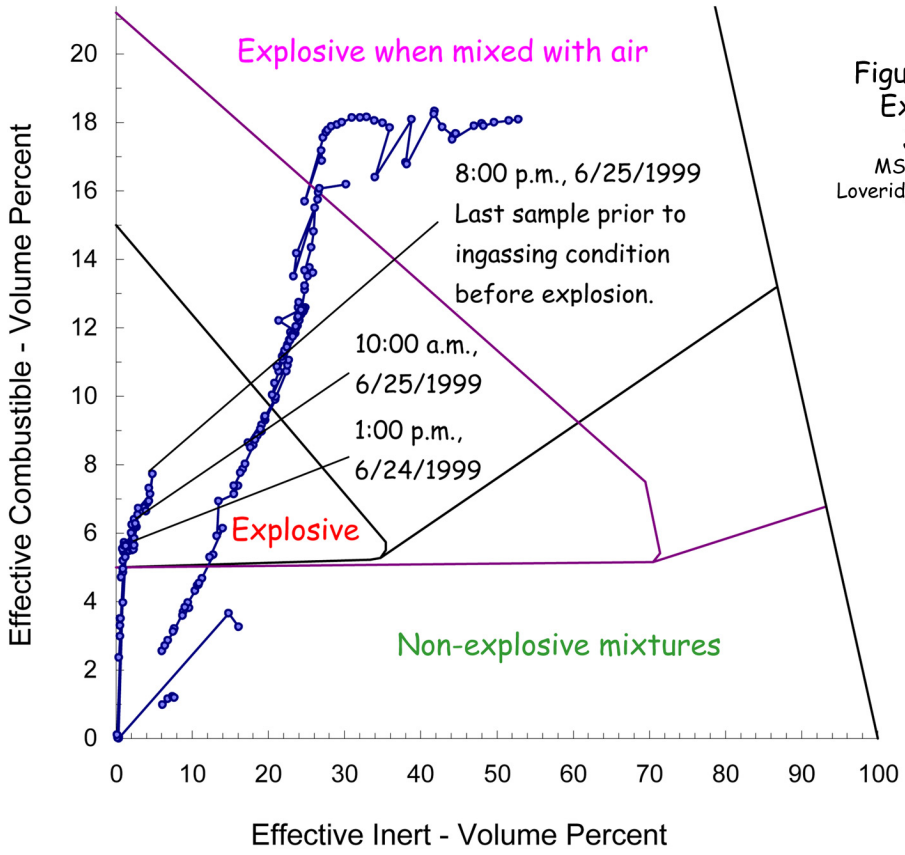


Figure 51 - St. Leo Shaft
Explosibility Diagram
June 22-26, 1999
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

R = 1.0
R = 0

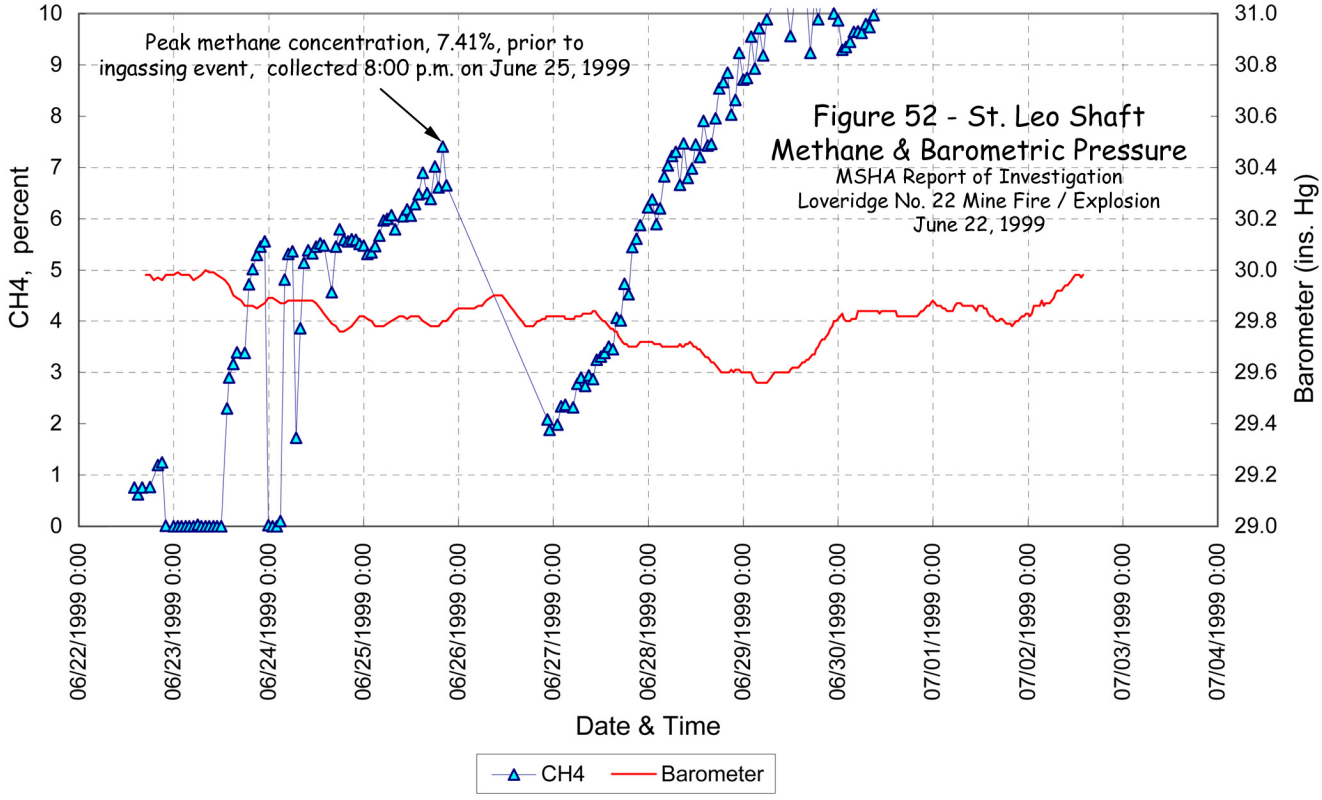


Figure 52 - St. Leo Shaft
Methane & Barometric Pressure
MSHA Report of Investigation
Loveridge No. 22 Mine Fire / Explosion
June 22, 1999

Figure 53
Electrical Schematic Diagram
Goodman Battery/Trolley Locomotive
23 Ton-201

Case 1
Trolley Pole: *Off*
Main Circuit Breaker (CB-M): *On*,
Control Circuit Breaker (CBD): *On*,
and Control Swicth(CSW): *On*

Energized Circuits

Nonenergized Circuits

Not to Scale

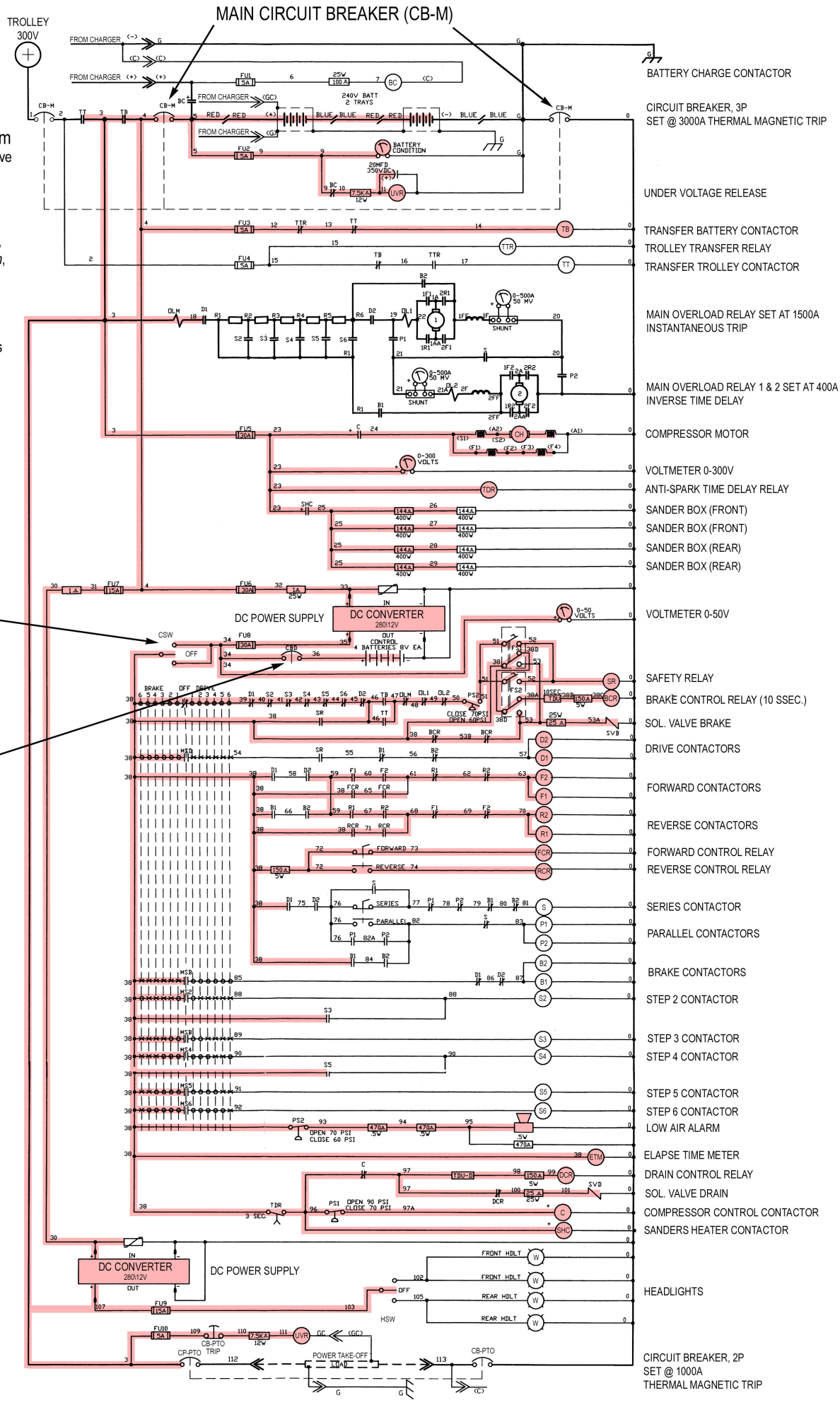


Figure 54
Electrical Schematic Diagram
Goodman Battery/Trolley Locomotive
23 Ton-201

Case 2
Trolley Pole: *Off*
Main Circuit Breaker (CB-M): *Off*,
Control Circuit Breaker (CBD): *On*,
and Control Swicth(CSW): *On*

Energized Circuits

Nonenergized Circuits

Not to Scale